

1       **Patent Claims:**

2

3       1. — ~~Block copolymer containing~~  
4       ~~a hydrophobic biodegradable polymer,~~  
5       ~~a hydrophilic polymer;~~  
6       ~~at least one reactive group for covalent binding of a surface-modifying substance d)~~  
7       ~~to the hydrophilic polymer b),~~  
8       ~~wherein the at least one reactive group e) is selected from 1) a functional group and/or~~  
9       ~~2) an at least bifunctional molecule with at least one free functional group with the~~  
10      ~~provision that if the hydrophilic polymer b) is polyethylene glycol, the reactive group~~  
11      ~~e) is not hydroxyl.~~

12

13      2. — ~~Block copolymer according to Claim 1,~~  
14      ~~characterised in that~~  
15      ~~the hydrophobic polymer a) and/or hydrophilic polymer b) are selected from a linear~~  
16      ~~and/or branched polymer.~~

17

18      3. — ~~Block copolymer according to one of the preceding claims,~~  
19      ~~characterised in that~~  
20      ~~the hydrophobic polymer a) is at least one polymer selected from polyester, poly-c-~~  
21      ~~aproplactam, poly-a-hydroxyester, poly-b-hydroxyester, polyamide, polyphosphazene,~~  
22      ~~polyanhydride, polydioxanon, polymalic acid, polytartaric acid, polyorthoester,~~  
23      ~~polycarbonate, peptide, polysaccharide and protein.~~

24

25      4. — ~~Block copolymer according to Claim 3,~~  
26      ~~characterised in that~~  
27      ~~the hydrophobic polymer a) is at least one polymer selected from polylactide,~~  
28      ~~polyglycolide, poly(lactide-co-glycolide), poly-b-hydroxybutyrate and poly-b-~~  
29      ~~hydroxyvalerate.~~

- 1       5. — Block copolymer according to one of the preceding claims,  
2       characterised in that  
3       the hydrophilic polymer b) is at least one polymer selected from polyethylene glycol,  
4       polypropylene glycol, polyethylene glycol/polypropylene glycol copolymer,  
5       polyethylene glycol/polypropylene glycol/polyethylene glycol copolymer,  
6       polybutylene glycol, polyacrylamide, polyvinyl alcohol, polysaccharide, peptide and  
7       protein.
- 8
- 9       6. — Block copolymer according to one of the preceding claims,  
10      characterised in that  
11      the reactive group c) is at least one selected from an amino group, thiol, carboxylic  
12      acid, keto group, an acid chloride, dicarboxylic acid amide, 3-maleic imidopropionic  
13      acid-N-succinimidyl ester and succinimidyl ester.
- 14
- 15      7. — Block copolymer according to one of the preceding claims,  
16      characterised in that  
17      the hydrophobic polymer a) is at least one selected from polylactide, polyglycolide  
18      and poly(lactide-co-glycolide).
- 19
- 20      8. — Block copolymer according to Claim 7,  
21      characterised in that  
22      the hydrophilic polymer b) is polyethylene glycol.
- 23
- 24      9. — Block copolymer according to Claim 8,  
25      characterised in that  
26      the polyethylene glycol has a molar mass in a range of 200 to 10 000 Da.
- 27

1       10. — Block copolymer according to one of the preceding claims,  
2       characterised in that  
3       the hydrophobic polymer a) is polylactide preferably with a  
4       molar mass in a range of 1 000 to 100 000 Da.

5

6       11. — Block copolymer according to one of the preceding claims,  
7       characterised in that  
8       the surface of the block copolymer is chemically structured by binding of surface-  
9       modifying substances d).

10

11       12. — Block copolymer according to one of Claims 1 to 11, characterised in that  
12       the block copolymer additionally contains at least one surface-modifying substance  
13       d), wherein substance d) is bonded to the hydrophilic polymer b) by means of the  
14       reactive group e).

15

16       13. — Block copolymer according to Claim 12,  
17       characterised in that  
18       the substance d) is at least one substance selected from a carbohydrate, peptide,  
19       protein, heteroglycan, proteo-glycan, glycoprotein, amino acid, fat, phospholipid,  
20       glycolipid, lipoprotein, medicinal agent, antibody, enzyme, DNA/RNA, a cell, dye  
21       and molecular sensor.

22

23       14. — Shaped body formed from a block copolymer according to one of Claims 1 to  
24       13.

25

26       15. — Shaped body according to Claim 14,  
27       characterised in that  
28       the shaped body is a film, particle, three-dimensional body, porous body or a sponge.

29

1       16. — Use of a block copolymer according to one of Claims 1 to 15  
2       for the production of drug targeting systems, drug delivery  
3       systems, bioreactors, for therapeutic and diagnostic purposes, for tissue engineering  
4       and as emulsifier.

5

6       17. — Process for the production of a block copolymer according to one of Claims  
7       12 or 13,  
8       characterised in that  
9       the at least one substance d) is converted with a block copolymer according to one of  
10      Claims 1 to 11, wherein the block copolymer is present in solution or in the solid  
11      phase.

12

13       18. — Process according to Claim 17,  
14       characterised in that  
15       for binding the at least one substance d), the block copolymer according to one of  
16      Claims 1 to 11 is used in the form of a porous shaped body.

17

18       19. — Process for the production of a block copolymer according to one of Claims  
19       12 or 13 or according to one of Claims 17 or 18,  
20       characterised in that  
21       in a first stage, the substance d) is provided with a reactive group e) and in a second  
22       stage, the complex composed of substance d) and reactive group e) is bonded by  
23       means of the reactive group e) to the hydrophilic polymer b) of a block copolymer  
24       composed of a hydrophobic polymer a) and a hydrophilic polymer b).

25

26       20. — Process for the production of a block copolymer according to one of Claims  
27       12 or 13 or according to one of Claims 17 to 19,  
28       characterised in that —

29

1 the binding of the at least one substance d) to the surface  
2 of the block co-polymer is achieved by generating a substrate pattern.

3  
4 21. Process according to Claim 20,  
5 characterised in that  
6 the substance d) is applied with a locally constant or variable concentration by means  
7 of the reactive group e) on the surface of a block copolymer containing a hydrophobic  
8 component a) and hydrophilic component b).

9  
10 22. Process according to Claim 20 or 21,  
11 characterised in that  
12 for binding the reactive group e) and/or the substance d) in a substrate pattern, the  
13 surface of the block copolymer is structured by a plotter, an ink jet printer, radiation  
14 with light, bombardment with particles, stamping or soft lithography.

15  
16 **Figures**

17 Abb. = Abbildung = Figure

18

19 **Figure 2**

20 bioabbaubares Polymer = biodegradable polymer

21

22 nicht bioabbaubares bzw. = non-biodegradable or slowly bio-  
23 langsam bioabbaubares degradable polymer

24 Polymer

25

26 Bindeglied = binding link

27

28 Oberflächenmodifizierende

29 Substanz = surface-modifying substance

1      **Figure 5**

2      Foetales Rinderserum = foetal cow serum

3      Bindung = bond

4

5      **Figure 6a**

6      Atriales Natriuretisches

7      Peptid = atrial natriuretic peptide

8      Bindung = bond

9

10     **Figure 6b**

11     Lachs-Calcitonin = salmon-calcitonin

12

13     **Figure 7**

14     nach .. Stunden = after .. hours

15

16     **Figure 9**

17     Farbstoffmenge = amount of dye

18

19     **Figure 10**

20     aktives Polymer = active polymer

21

22     Glas = glass

23

24